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Marine Corps University
2076 South Street
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MASTER OF MILITARY STUDIES

NAVY FORCE STRUCTURE CHANGES REQUIRED IF ASSIGNED THE ROLE OF NATIONAL MISSILE DEFENSE

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LCDR ROGER D. HARDY

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Abstract
The end of the cold war has significantly reduced the threat of a large-scale battle between great powers and redefined the primary threats facing the U.S. One of these primary threats is the threat posed by intercontinental ballistic missile armed with weapons of mass destructions. To deal with this evolving threat, the Congress has mandated that a land based National Missile Defense system capable of defending the U.S. homeland be developed. However, many military analysts believed that the surface Navy already had the framework for accomplishing this mission. These analysts believed that upgrading existing Aegis surface ships would produce a limited sea-based National Missile Defense system that could be deployed cheaper, faster, and more flexible than the land based proposal. Analysis of the sea-based proposal identifies several reasons that the use of existing ships in not feasible. Today's Navy is smaller yet continues to perform the same traditional missions and roles as it performed during the height of the Cold War. The smaller force coupled with the significant technical and organizational changes that are required to accomplish the National Missile Defense Mission will significantly reduce the capability of the current surface Navy. Additionally, the current fleet is getting older and more outdated. For the surface Navy to assume the mission of National Missile Defense, the Navy must develop newer and more capable ships specifically designed to perform this mission. The acquisition of 10 ships built and designed solely for National Missile Defense would provide the Congress mandated defense of the U.S. homeland.

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The end of the cold war has significantly reduced the threat of a large-scale battle between great powers and redefined the primary threats facing the U.S. One of these primary threats is the threat posed by intercontinental ballistic missile armed with weapons of mass destructions. To deal with this evolving threat, the Congress has mandated that a land based National Missile Defense system capable of defending the U.S. homeland be developed. However, many military analysts believed that the surface Navy already had the framework for accomplishing this mission. These analysts believed that upgrading existing Aegis surface ships would produce a limited sea-based National Missile Defense system that could be deployed cheaper, faster, and more flexible than the land based proposal. Analysis of the sea-based proposal identifies several reasons that the use of existing ships in not feasible.

Today's Navy is smaller yet continues to perform the same traditional missions and roles as it performed during the height of the Cold War. The smaller force coupled with the significant technical and organizational changes that are required to accomplish the National Missile Defense Mission will significantly reduce the capability of the current surface Navy. Additionally, the current fleet is getting older and more outdated. For the surface Navy to assume the mission of National Missile Defense, the Navy must develop newer and more capable ships specifically designed to perform this mission. The acquisition of 10 ships built and designed solely for National Missile Defense would provide the Congress mandated defense of the U.S. homeland.

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EXECUTIVE SUMMARY

Title: Navy Force Structure Changes Required If Assigned The Role of National Missile Defense

Author: LCDR Roger Hardy, USN

Thesis: Surface Navy Force Structure will change if assigned the role of National Missile Defense.

Discussion: The analysis contained will support the thesis that additional surface ships are required to perform the mission of National Missile Defense, if assigned.

Chapter 1 provides the introduction to the topic and gives a short background on the importance of National Missile Defense and the reason it has become a hotly debated topic.

Chapter 2 outlines the current and future threats to the U.S. homeland, deployed forces and its allies. The chapter will also define Weapons of Mass Destruction and the national emergency that the worldwide expansion of the proliferation of these weapons has generated.

Chapter 3 outlines the Navy Area Defense and Theater Wide Defense systems being developed for deployment on current Aegis surface ships. The chapter also discusses notional land and sea-based National Missile Defense Systems and the primary elements of these notional systems.

Chapter 4 details the current Navy force structure and its ability to support current missions. The chapter also proposes the force structure changes that would be required for the surface Navy to support a mission of National Missile Defense and the budgetary concerns associated with the changes required changes in force structure.

Chapter 5 outlines the conclusions drawn from analysis of this information.

Conclusion:

The foundation for the proposed sea-based National Missile Defense (NMD) system is strategically stationed surface ships using an upgraded Aegis combat system for intercontinental ballistic missile detection, tracking, and intercept employing upgraded Standard missiles. The use of upgraded current Aegis ships as the foundation of the proposed sea-based National Missile Defense (NMD) system will significantly hamper the ability of the current and future Navy to perform its peacetime and combat operation missions.

The Aegis surface ship is a multi-mission platform that uniquely employs its Aegis combat system, vertical launching system and Tomahawk cruise missile launch capability to be effective in numerous war-fighting areas[1]. In peacetime, Aegis surface combatants carry out a wide range of day-to-day overseas presence missions and enhance U.S. crisis response capabilities; during conflict, surface combatants conduct combat operations against enemy submarines, surface ships, aircraft, missiles and targets ashore either independently or with other military forces.[2] The proposed addition of National Missile Defense as a primary mission will require dedicated surface platforms that perform a singular mission. National Missile Defense is a strategic mission that will limit the flexibility and to remove the multi-mission capability of the current Aegis surface fleet.

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[1] Aegis is an integrated network of computers and displays linked to sensors and weapon systems capable of simultaneously detecting, tracking, engaging numerous air and surface targets. VLS is a computer-controlled launching system that can store, select, initialize, and rapidly launch different type missiles. Tomahawk is an all-weather, subsonic missile capable of striking sea and land targets located more that 500 miles away. It is launched form surface combatants or attack submarines.
United States General Accounting Office (GAO), National Security and International Affairs Division. *Report to Congressional Committees, Surface Combatants, Navy Faces Challenges Sustaining Its Current Program.* (Washington D.C.: 1997) 2.

[2] GAO, Navy Surface Combatants, 2.

The analysis presented in this research paper recommends building ten Aegis platforms specifically designed for National Missile Defense. These ships would be primarily responsible for the employment of sea-based interceptors in the defense of the U.S. homeland.

Chapter 1: Introduction

Background

With the end of the Cold War and a decreased likelihood of a large-scale open ocean engagement with Soviet maritime forces, the mission and size of the U.S. Navy has changed. The Navy's mission has evolved from trying to defeat a large Soviet fleet to a mission that emphasizes overseas, or forward, presence-having its ships patrol the world's oceans to deter conflict.[3] The removal of a formidable maritime threat and the subsequent change in mission has also caused a significant change in force structure. The Navy of today is in direct contrast to the Navy of the 1980's that nearly reached a force structure of 600 ships. The Navy of 2000 at 314 ships is approximately half the size of the fleet in 1989. The force reduction affects all areas of the fleet, (surface, subsurface, and amphibious). The change in the Navy's mission coupled with the reduction in force structure has necessitated an improvement in the quality of the ships performing this mission. The Navy of today has replaced quantity with quality. Today, ships are more efficient, better equipped and more technologically advanced especially the Aegis surface fleet. Aegis-capable ships are effective in numerous war-fighting areas and tasks and are able to defend themselves and protect other

[3] U.S. Congress, Congressional Budget Office(CBO). *Budgeting for Naval Forces*: *Structuring Tomorrow's Navy at Today's Funding level.)* 2.

forces while providing critical support to ground forces[4]. These ships perform more effectively than non-Aegis capable ships and can operate independently in high threat areas[5]. The better-equipped surface ships employ technological advances such as the Aegis combat system, the vertical launching system (VLS), and the capability to launch Tomahawk cruise missiles[6]. These technological advances coupled with the Navy's newly emphasized mission of forward presence has initiated a debate that focuses on the feasibility of the surface Navy performing sea-based National Missile Defense (NMD) to defend the homeland of the United States against intercontinental ballistic weapons of mass destruction (WMD) launched from enemy states.

The debate to develop and deploy a sea-based NMD stems from the threat caused by proliferation, the growing distribution and sale of the equipment and technical knowledge required to build and launch intercontinental ballistic missiles armed with WMD warheads. The debate on the growing proliferation threat was illustrated by the Central Intelligence Agency's, Robert Walpole, National Intelligence Officer for Strategic and Nuclear Programs, report to the Senate subcommittee on International Security, Proliferation, and Federal Services on 9 February 2000:

> *The proliferations of medium range ballistic missiles-driven primarily by North Korean No Dong sales-has created an immediate, serious and growing threat to US forces, interests and allies in the Middle East and Asia and has significantly altered the strategic balances in the regions. Furthermore, during the period from 2001-2005, North Korea, Iran and Iraq could test international continental ballistic missiles (ICBMs) of varying capabilities-some capable of delivering several –hundred kilogram payloads to the United States*[7].

[4] GAO, Navy Surface Combatants, 3.
[5] GAO, Navy Surface Combatants, 2.
[6] GAO, Navy Surface Combatant, 34.
[7] Moore, Thomas and Spring, Baker, *Missile Defense, Ending U.S. Vulnerability* (Washington D.C.: 1999) .

This report to the Senate was in response to the 1995 National Security Strategy that identified the proliferation of weapons of mass destruction (WMD) as one of the principle dangers the military must address.[8] One means of dealing with the growing threat posed by the proliferation of WMD is the development of a national missile defense (NMD) system. NMD was initially proposed as a land based system using ground-launched interceptors to destroy intercontinental ballistic missiles targeted at the U.S. homeland. As the system was being discussed and developed, the signing of the 1999 National Missile Defense Act by former President Clinton legally bound America to defend its citizens from missile attack by mounting a national missile defense system "as soon as is technically possible."[9] Once committed to national missile defense, discussions on whether a land-based system was the quickest means of satisfying the intent of the act were initiated. To counter the land-based system, a sea-based option was proposed. The sea-based supporters believe that a land-based system would be too expensive and would take too long to build because the system construction will have to be built from "the ground up."[10] The supporters of a sea-based NMD also argue that the system could be deployed faster and cheaper because existing technology could be used. Support for a sea-based NMD was outlined in a Heritage Foundation report, *"The Quickest Way to Global Missile Defense: From the Sea"* and included the published support of the former Chief of Naval Operations, Admiral Jay Johnson and three former Pentagon officials, former Secretary of Defense Harold Brown and

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[8] Department of Defense, National *Military Strategy of the United States. (*Washington D.C.: Chairman of Joint Chiefs of Staff, 1995) 2.
[9] Spencer, Jack and Dougherty, Joe. *The Quickest Way to Global Missile Defense: From the Sea.* (Heritage Foundation: 2000) 1. This quote in the report was restated from the National Missile Defense Act of 1999.
[10] Ibid, 2.

former Deputy Secretaries of Defense John Deutch and John White as proponents of sea-based NMD.[11] In response to these discussions, the surface Navy is spearheading the development of a NMD system that will be forward deployed and uniquely positioned to respond to a worldwide WMD threat or crisis.

The ability to launch sea-based ballistic missile interceptors is a unique and complex dynamic that requires advanced technology and weapons currently not available in the Navy's missile inventory. The technological advances required are the development of extended range missiles capable of intercepting ballistic missiles traveling in the exo-atmosphere; command and control equipment that will conduct trajectory analysis and relay the information to a ship at sea anywhere in the world, and the intelligence information on an anticipated launch point to ensure the ship is accurately stationed within its missile intercept envelope. To complicate further the idea of sea-based NMD, the ships proposed to conduct the mission, are the existing Aegis ships in the U.S. fleet. The Aegis platform is being considered because of its proven successful employment of the Standard missile, its sophisticated radar suite, and its unique ability to be stationed within intercept range of a missile fired from a "state of concern" but outside that country's retaliatory range. Additionally, the surface Navy's unique ability to be fully armed and forward deployed throughout the world ready to respond to a crisis in a moments notice, drastically improves the capability and the flexibility of the NMD system.

Aegis surface ships are multi-mission platforms currently serving as the carrier battle group air defense coordinator, the primary surface fire support platform, and an essential element for worldwide power projection through the firing of Tomahawk missiles. The

[11] The report outlines these defense officials' supports for the expedient development of a sea-based National Missile Defense System.

discussion to include sea-based platforms in the NMD structure elicits several dilemmas for the system planners and the naval service:

1. If assigned a role of NMD, will Aegis platforms become single mission national assets, similar to the fleet ballistic missile submarines?
2. Will the Navy's ability to perform its current mission be affected by the inclusion of NMD as a primary mission?
3. Does the current Navy force structure support the performance of the NMD mission?

The analysis contained in this research paper will examine the surface Navy's role in NMD and the force structure changes required to successfully accomplish a mission of NMD.

Chapter 2

Ballistic Missile Threats to the United States

The end of the Cold War and subsequent break-up of the former Soviet Union have greatly reduced the threat of a large-scale global conflict between the world's great powers. The threat of global conflict has been replaced by the proliferation of WMD as the one of the most significant threats facing the United States[12]. The WMD threat is derived from long-range ballistic missiles already in the possession of Russia and China and the procurement of the technology and materials by numerous Third World countries, which may already have or may be developing WMD (including nuclear weapons) and ballistic missiles.[13] The countries actively seeking to develop these weapons are Iran, Iraq, North Korea, Pakistan and India. The acquisition of long range ballistic missiles armed with WMD will enable these

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[12] Cohen, William. Annual Report to the President and the Congress. (Washington D.C. 2000) 3. In this report Secretary of Defense outlined that one of the particular concern of the defense strategy is the growing threat of ballistic missile attack against the United States from such countries as North Korea and Iran and the unauthorized or unintentional launch from China and Russia.

[13] Walpole, Robert, D. *Statement for the Record to the Senate Subcommittee on International Security, Proliferation and Federal Services on The Ballistic Missile Threat to the United States.* (Washington D.C.: 2000) 3.

weaker countries to do three things they otherwise might not be able to do: deter, constrain, and harm the U.S. (mainland).[14] In response to this growing threat, President Clinton declared the following in Executive Order 12938 on November 14, 1994:

> *I William J. Clinton, President of the United States of America, find the proliferation of nuclear, biological, and chemical weapons (Weapons of Mass Destruction) and the means of delivering such weapons, constitutes an unusual and extraordinary threat to the national security, foreign policy, and economy of the United States and hereby declare a national emergency to deal with the threat.*[15]

The president's concern and action suggests that the acquisition and development of WMD systems can threaten the U.S. and its allies worldwide. According to a 1999 CIA report titled "*Foreign Missile Developments and the Ballistic Missile Threat to the United States Through 2015"* the number of countries possessing the capability to deploy ballistic missiles has increased since the end of the Cold War. The report also suggest that several other means of delivering WMD's to the United States have probably been devised such as biological or chemical weapons that could be prepared and used in metropolitan areas or short ranged missiles that could be deployed against surface ships. These alternative means of delivering weapons do not provide a nation the same prestige and degree of deterrence or coercive diplomacy associated with an intercontinental ballistic missile[16]. The systems being developed and tested in these countries also indicate that the proliferation of WMD and ballistic missile technology is becoming more widespread and more advanced. The

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[14] Central Intelligence Agency. *National Intelligence Council, Foreign Missile Developments and the Ballistic Missile Threat to the United States Through 2015. (*Washington D.C.: 1999) 5.
[15]Moore, Thomas and Spring Baker, *Missile Defense, Ending U.S. Vulnerability* (Washington D.C: Heritage Foundation.) 3.
[16] Central Intelligence Agency (CIA), *National Intelligence Council, Foreign Missile Development and the Ballistic Missile Threat to the United States Through 2015*. (Washington D.C CIA 1999) 2.

demonstrated progress of countries toward acquiring longer-range ballistic missiles is apparent in the tests conducted over an 18 months period from 1998 through 1999:

1. North Korea's launch of the three stages Taepo Dong-1 space launch vehicle (SLV) in August 1998.
2. Pakistan flight-tested its 1,300 km range Ghaur missile.
3. Iran flight-tested its 1,300 km range Shahab 3 missile.
4. India flight tested its Agni II MRBM, estimated range 2,000 km.
5. China conducted the first flight of its DF-31 mobile ICBM, range 8,000 km.[17]

Although not all these countries pose a direct or credible threat to the U.S., these tests indicate that the sale and distribution of WMD materials led by Russia, China, and North Korea has increased since the end of the Cold War. Russian states continue to supply a variety of ballistic missile-related goods and technical know-how to countries such as Iran, India, and Libya.[18] This support has been in the form of civilian nuclear missile technology to Iran and India, biotechnology and chemicals to Iran, and a major supplier of WMD equipment, materials and technology to Iran[19]. North Korea and China also continued their sale of WMD equipment and materials to countries around the world. North Korea's own ballistic missile development is primarily financed by the sale of WMD equipment, technically, and information throughout the world. The export of ballistic missiles and related technology remains one of North Korea's major sources of hard currency to support its continued missile development and production.[20]

[17] Ibid. 9.
[18] Central Intelligence Agency. *Unclassified Report to Congress on the Acquisition of Technology Relating to Weapons of Mass Destruction and Advanced Conventional Munitions, 1 July Through 31 December 1999* (Washington D.C.: 2000) 6.
[19] Ibid, 7.
[20] Ibid 7.

Chapter 3

National Missile Defense

National Missile System Development Assumptions

The development of a NMD system encompasses many technical areas and a full exploration of each of these lies beyond the scope of this paper. The paper will focus on the changes required in the surface Navy force structure to conduct NMD, if assigned the mission. To better help the reader understand the applicability of the surface Navy to NMD, the following assumptions and writing guidelines are made:

1. Aegis ships performing NMD will remain in international waters.
2. Weather or other natural phenomena will not affect the ship's communications with space-based satellites or the launch of the interceptor missiles.
3. Aegis ships conducting NMD will have no other assigned missions i.e. carrier escort, air defense, fire support and etc.
4. Only vertical launch equipped Aegis ships will be considered during this analysis.
5. Analysis will only consider the intercept of ballistic missiles during the boost phase.
6. Surface ship NMD's applicability to the Anti-Ballistic Missile treaty will not be addressed.

National Missile Defense Architecture: Notional System

The need for a National Missile Defense (NMD) system is mandated by the National Defense Authorization Act for fiscal year 1996 as outlined in the 'Ballistic Missile Defense Act of 1995'. This act required the Secretary of Defense to submit to the congressional defense committees an annual report describing the technical milestones, schedule, and cost of each ballistic missile defense program to include Navy Lower and Upper Tier, Boost Phase intercept, National Missile Defense, and Theater High Altitude Area Defense

(THAAD) programs.[21] The current notional design of the National Missile Defense (NMD) program of the Department of Defense is a ground-based missile defense system designed to protect the United States against limited ballistic missile threats from "states of concern".[22] The system is being developed to provide limited defense for the U.S. homeland against intercontinental ballistic missiles armed with nuclear, biological, or chemical warheads. The proposed current system is composed of five major parts. These parts are:

1. Ground Based Interceptors (GBI) - these are the surface launched missiles that will intercept the inbound threats.
2. X-Band Radar (XBR) – a forward deployed ground based, multi-functional radar that performs acquisition, tracking, discrimination, and kill assessment.
3. Upgraded Early Warning Radar (UEWR) – larger, fixed, phased-array surveillance radars used to detect and track ballistic missiles directed into the United States.
4. Battle Management/Command, Control, and Communications (BM/C3) – the "brain" of the system. Allows the Commander-in-Chief to control and operate the NMD system.
5. Space Based Infrared System (SBIRS) – being developed by the Air Force to acquire and track ballistic missiles throughout their trajectory.[23]

However, recent debate on the topic has centered on the development and deployment of a sea-based NMD to replace and/or compliment the land-based system. One proposed construction outlines a system that integrates space, land, and sea-based technology into a system capable of detecting, identifying and intercepting an incoming missile threat. The sea-based NMD system design is an evolution of the planned Navy Theater Wide (NTW) system that is an extension of the Navy Area Defense system.

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[21] United States House of Representatives. H.R. 1530, *Ballistic Missile Defense Act of 1995* (Washington D.C.: 1995) 3.
[22] Department of Defense. *National Missile Defense Architecture.* (Washington D.C.: Ballistic Missile Defense Organization 2000) 1. States of concern include Russia, China, North Korea, Iran, and Iraq.
[23] Ibid, 2.

Navy Area Defense

The Navy Area Defense program is a sea-based detection, tracking and intercept system. The Navy Area Defense system is designed to intercept "low-tier" (below 40 km altitude) targets. The system will provide area defense by upgrading or modifying existing Aegis radars for longer-range detection and employing the SM-2, Block IVA Standard missiles against shorter-range theater ballistic missiles or warheads in their descending or terminal phase.[24] This upgraded missile is equipped with a side-mounted infrared seeker that will improve performance against low flying cruise missiles and against tactical ballistic missiles.[25] This system is currently planned for deployment and testing on two Aegis cruisers.

Navy Theater Wide Defense

The Navy's Upper tier theater missile defense system is called Navy Theater Wide (NTW) and is being developed as the follow-on system to Navy Area Defense[26]. NTW is being designed to intercept "upper tier" (altitudes greater than 40 km) medium and intermediate-range ballistic missiles (or their separated warheads) during the mid-course phase of their ballistic flight.[27] The NTW system will also use existing Aegis ships outfitted with an upgraded Aegis combat systems suite and an upgraded and newly designed version of the Standard missile, the three stage SM-3.[28] The employment of the NTW system will

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[24] Ibid, 9.
[25] National Security Space Road Map (NSRM). *Navy Area Defense (U)* (Washington D.C: 1999) 1
[26] Jones, Rodney, M. 9
[27] Jones, Rodney, M. 9.
[28] Ibid, 9.

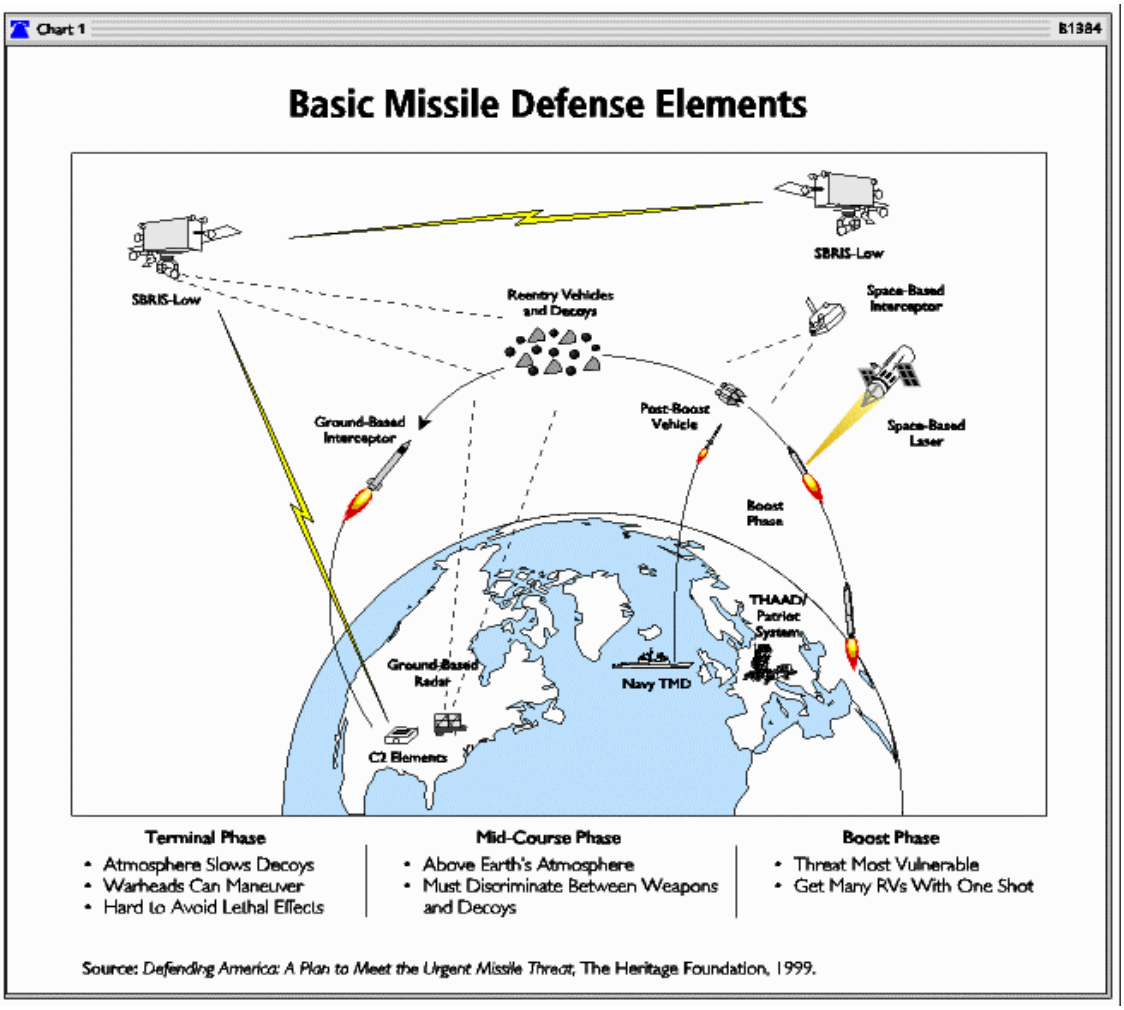
allow the Aegis ship assigned the role of theater missile defense to cover a larger area and intercept enemy missiles at a longer range.

Sea-based National Missile Defense
Notional Design

The follow-on NMD system will provide defense against intercontinental ballistic missiles. The sea-based NMD system is designed to receive early warnings from space-based satellites. The satellites pass detection information to a land based Battle Management/Command, Control, and Communications (BM/C3) system where the information is evaluated, validated and disseminated to the appropriate interceptor. In this futuristic design, the interceptors are space, land and sea-based[29]. While the designated interceptor is preparing to engage the target, the BM/C3 system will continue to process radar and other system data in order to provide more accurate information to the interceptor so it can better discriminate between debris, false objects and real warheads.[30] In this system, the proposed space interceptors are lasers and the sea-based interceptors are upgraded Standard missiles launched from a forward deployed Aegis surface combatant. Figure 1 depicts the basic architecture of a proposed land, space and sea-based system. Based on this model of NMD, the Aegis ship is positioned within the acquisition, tracking and destruction range of the ballistic missile launch point. The Aegis ships assigned the mission of NMD, will patrol a specific part of the world with strategic stationing being conducted to ensure intercept of the launched ballistic missile.

[29] The conceptual plan for space-based interceptors is lasers mounted on satellites or some other earth-orbiting sphere. Land based interceptors will be ground silo housed missiles based in Alaska or Hawaii. The final design for these land-based interceptors remains in the planning stages.
[30] Department of Defense. *National missile Defense Architecture*. (Washington D.C.: Ballistic Missile Defense Organization 2000) 1.

Figure 1. Notional architecture of a sea-based National Missile Defense system.



Ballistic Missile Defense Organization

As part of its recognition of the threat posed by ballistic missiles, the Navy has established the theater ballistic missile defense (TBMD) organization within the Surface

Warfare Directorate.[31] This organization is assigned the task of developing and assessing current and future systems to counter the growing ballistic missile threat to U.S. forces throughout the world. The Navy's system development is centered on the Aegis surface platforms and the next generation of Standard missiles they will carry. The demonstrated capability of the AEGIS ship to track ballistic missiles while operating in international waters, demonstrates the significance of leveraging the US's investment in the AEGIS fleet to field a credible, forward deployed theater ballistic missile defense capability.[32] Continued testing and development is warranted as the surface Navy expands its role in ballistic missile defense.

Chapter 4

Navy Force Structure

Current Force Structure

Since the elimination of a credible maritime threat to our carrier battle groups, the number of surface combatants in the Navy's inventory has decreased. This decrease is directly linked to the United States command of the seas and a detailed post Cold War "Bottom-up Review" conducted to assess the number of ships required to support the Navy's future mission. The review determined a smaller, more capable force was required. To meet the goals and intent of the review, the surface fleet reduced its total force by decommissioning older less capable destroyers, cruisers, and frigates and by placing other ships in the inactive reserve. Currently, the Navy is building one class of surface combatant, the Arleigh Burke destroyer. The Navy is procuring about three Arleigh Burke destroyers

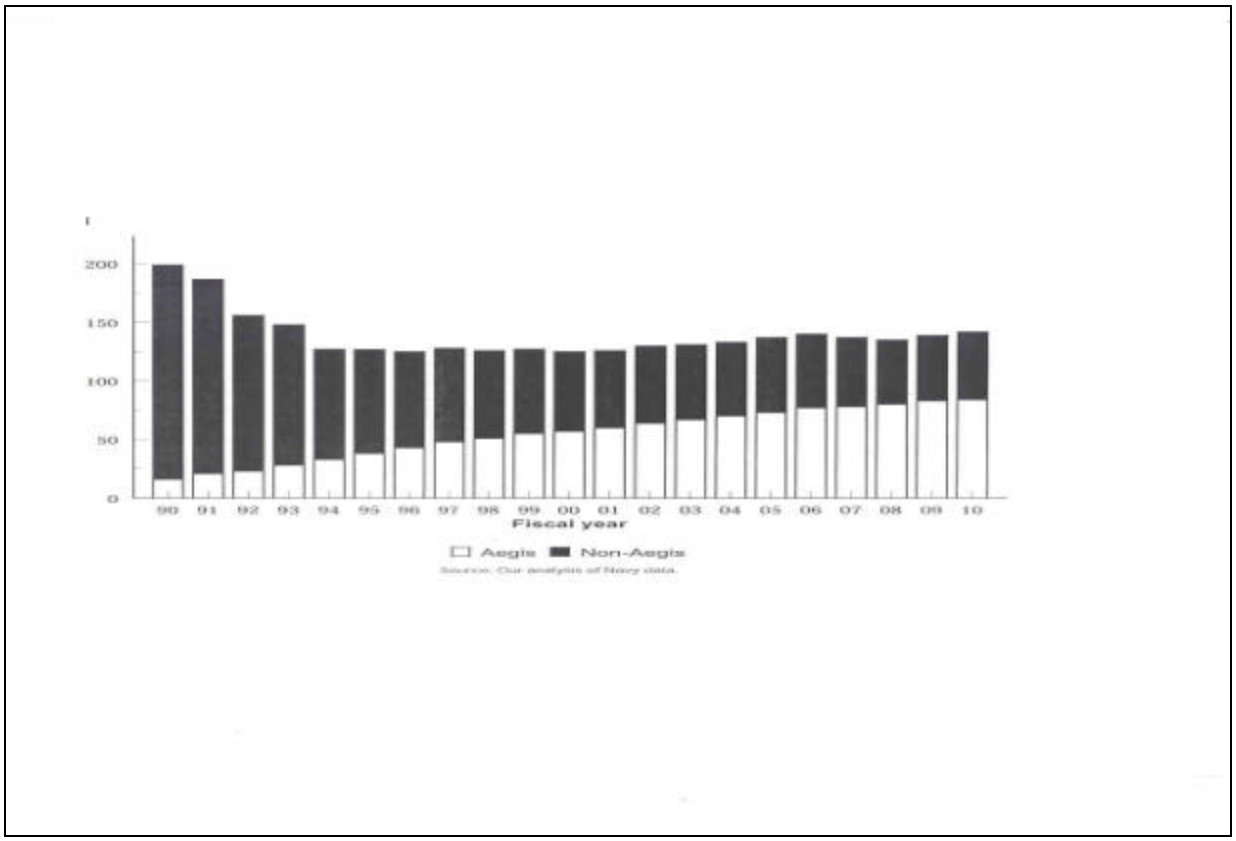
[31] U. S. Navy, Surface Warfare Division, *Theater Air Dominance*. (Washington D.C.: 1999) 1.
[32] Ibid 1

annually.[33] The continued procurement of this class of ship is essential to maintain anticipated force structure requirements.

Although smaller in force strength, the surface fleet is still a formidable fighting entity superbly executing its mission. The surface fleet is a force that has changed in its composition and make-up. The current surface combatant Navy is composed of approximately 108 active ships and 8 reserve ships.[34] The change in force make-up is characterized by the increase in the overall percentage of AEGIS, Ticonderoga and Arleigh Burke, class ships in the surface fleet[35]. These ships have replaced the older and less capable non-Aegis frigates, destroyers and cruisers as the mainstay of the U.S. surface fleet (see figure 2 for an illustration of the changes).

[33] GAO, Navy Surface Combatants. 6.
[34] Cohen, William, Annual Report to the President and the Congress. (Washington D.C.: U.S. Government Printing Office, 2000) 46.
[35] The Aegis combat system is an integrated network of computers and displays linked to sensors and weapons systems. It is capable of simultaneously detecting, tracking, and engaging numerous air and surface targets. The Aegis system is effective against anti-ship cruise missiles, manned aircraft, and electronic countermeasures.

Figure 2. Number of Aegis-Capable Surface Combatants through the year 2010.



Currently, there are 27 Ticonderoga class Cruisers and 29 Arleigh Burke class Destroyers[36]. Of the 27 Cruisers, only 22 ships were built with the Vertical Launch System (VLS).[37] The first five ships built are less capable technically and are not VLS capable; these

[36] The Ticonderoga class cruiser is 567 feet long and carries two embarked SH-60 helicopters. The ship has 61 cell VLS launchers forward and aft, fires torpedoes and has both passive and active sonar capability. The Aegis system is comprised of four phased-array SPY-1 radars that provide 360-degree air and surface coverage. The Arleigh Burke destroyer is 506 feet long. The Flight I destroyers have no embarked helicopter capability and 90 VLS launcher cells. The Flight IIA destroyers will have the capability to carry two embarked helicopters 96 VLS launcher cells. The destroyer is effective against surface, subsurface, air and electromagnetic targets.

[37] VLS is a computer controlled launching system that allows for the rapid selection, deployment, and vertical launch of several different types of missiles. The missiles include the SM-2, Tomahawk, and vertically launched ASROC (VLA).

five ships are part of the Navy's smart ship concept and will not be considered in this analysis[38].

The Aegis ships are the surface Navy's most capable platforms and the focal point of current and future surface operations. These platforms are extremely versatile, multi-mission ships and are considered effective in numerous war-fighting areas and tasks and are best able to defend themselves and protect other forces while providing critical support to ground forces.[39] The advent of the AEGIS platform to the surface fleet resulted in the fleet being classified into two distinct categories, Battle Force Capable (BFC) or Protection of Shipping (POS).[40] BFC ships as are defined as ships capable of power projection in a Carrier Battle Force or as units in a Surface Action Group (SAG) without the support of a Carrier. POS ships are ships intended to protect traditional convoys, underway replenishment groups, and amphibious assault groups. As the surface fleet continues to downsize and the AEGIS platform continues to dominate the surface ship inventory, more AEGIS platforms will be required to perform the POS role (see Figure 3 for projected surface combatant make-up projected through 2020). Although the number of surface combatants has declined, the number and percentage of Aegis platforms continue to increase. The share of Aegis capable ships in the force will increase from 56 percent to 68 percent by fiscal year 2005.[41]

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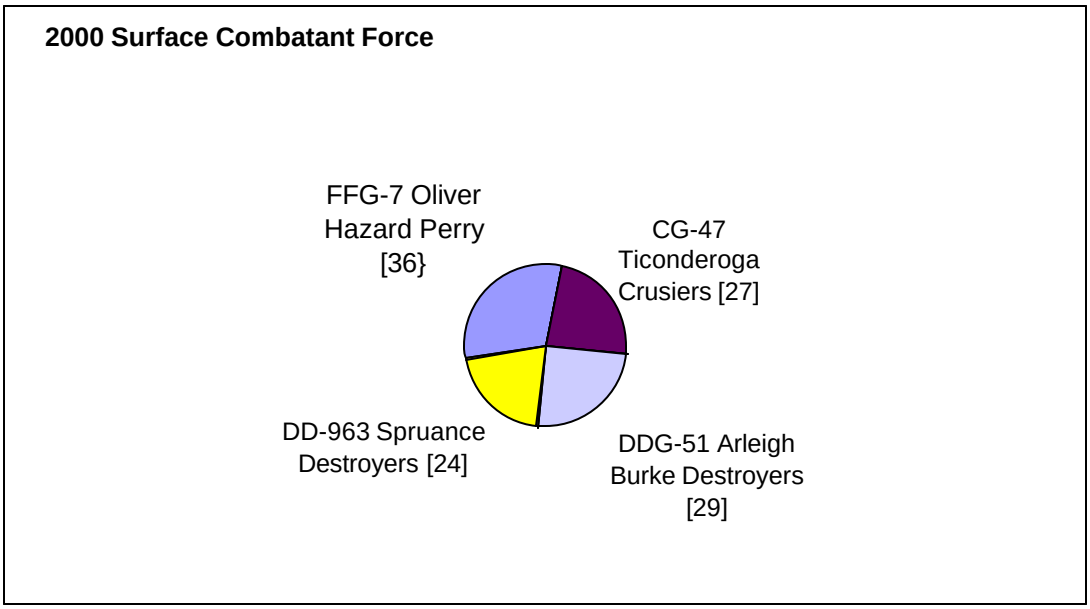
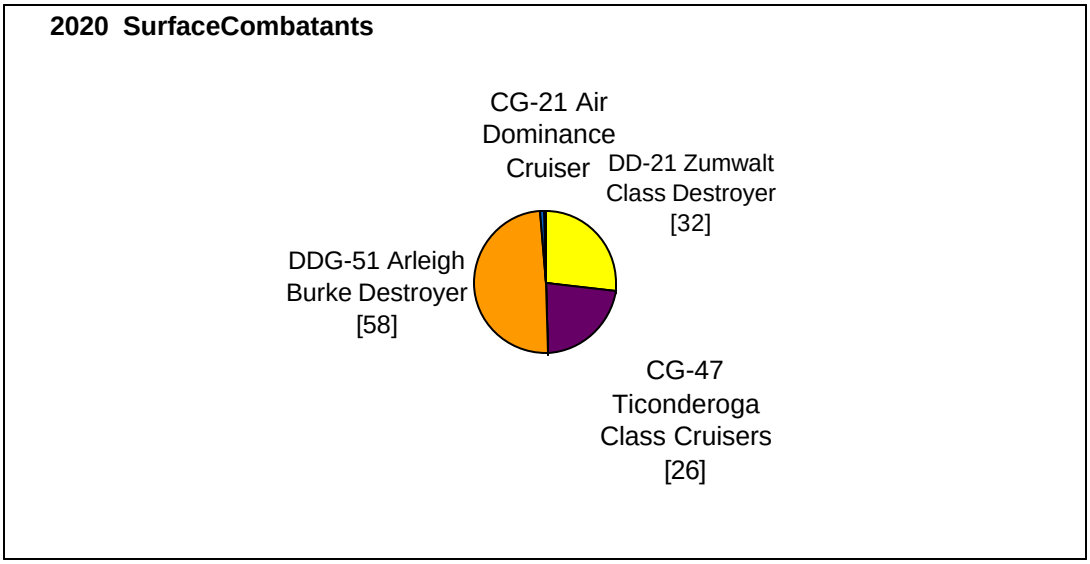
[38] VLS provides a ship with the ability to more rapid launch fire long-range Tomahawk or standard missiles. This ability makes the VLS ships more capable.
[39] Unites States General Accounting Office, National Security and International Affairs Division. *Report to Congressional Committees, Surface Combatants, Navy Faces Challenges Sustaining Its Current Program* (Washington D.C.: 1997) 17
[40] FAS Military Analysis Network, *Surface Combatant Force Requirement Study* (Washington D.C.: 1998) 2
[41] Ibid, 60.

Figure 3: 2000 and 2020 Surface Combatants by number.





Source: Congressional Budget Office Report to Congress in October 2000.

Currently, Aegis surface ships deploy as part of a carrier battle group or as part of a Surface Action Group (SAG).[42] Each will normally deploy with 2-3 Aegis platforms. While on deployment, the AEGIS ships traditionally perform the missions of area air defense, carrier escort, and Tomahawk land attack mission. The deployed ships perform a crucial role in the overall national strategy of the U.S., forward presence. Being forward deployed means the Navy can rapidly respond to a crisis and provide stability and deterrence.[43] Also, part of being forward in a post-Cold War environment requires deployed ships to perform port visits, multi-national exercises and humanitarian assistance, when required. These less traditional war fighting missions solidify the Navy's role as international "ambassadors of good will."

Forward presence and goodwill missions are essential, but the most essential mission performed by the surface Navy is the protection of the carrier. The carrier in a deployed battle group is the high value unit for the most demanding military requirement on U.S. forces, the capability to fight and win two major theater wars in overlapping time frames.[44] U.S. military strategy specifies a number for aircraft carriers, 12, …but not a particular surface combatant force size for carrying out this strategy.[45] Although not specifically mandated, the surface fleet will maintain sufficient strength and numbers to support and defend the carrier battle group. The principally designated units for performing this mission are the Aegis surface ship. The current surface force structure is based on maintaining 12 carrier battle groups. Based on this traditional requirement approximately 24-36 Aegis

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[42] Carrier battle group is generally comprised of a carrier, 2-3 Aegis escort ships, 2 nuclear attack submarines, and a logistics ship. This battle group is the Navy's primary means of exercising forward presence and worldwide crisis response. Surface Action Group (SAG) is generally composed of 2-3 surface platforms and deploys for specific requirements such as humanitarian assistance or for participation in an allied exercise.

[43] GAO, Surface Combatants, 37.

[44] Cohen, William S., p. 18.

[45] GAO, Surface Combatants, 33.

platforms are needed to deploy with the carriers. However, as the number of non-Aegis platforms in the surface Navy inventory continue to decline, the number of Aegis platforms that deploys, as part of a carrier battle group will increase. The anticipated increase in the number of Aegis ships deploying as carrier escorts coupled with the additional requirement of participating as part of a SAG highlights the potential risk for the Aegis platform to be over utilized. The Navy's Surface Warfare Division's August 1995 Surface Combatant Force Level Study concluded that 165 cruisers, destroyers, and frigates would be needed through 2010 to meet the war-fighting requirements of two nearly simultaneous major regional conflicts.[46] Currently, the surface Navy has 108 active ships and 8 reserve ships. In the five years since the report, the actual size of the surface fleet was reduced by nearly one-third of the projected size required to fulfill it mission. However, the mission and deployment requirements for surface combatants have not been reduced. Additionally, according to the annual report of the Secretary of Defense to the President and Congress, six non-Aegis Destroyers will be decommissioned in favor of maintaining an equal number of frigates.[47] The frigates that will remain on active service cannot fire Tomahawk missiles and thus, decommissioning the non-Aegis destroyers will reduce the number of Tomahawk missile platforms available in the fleet. This reduction in force will increase the Navy's reliance on the Aegis ships for Tomahawk missile power projection missions.

The decommissioning of older, less capable ships will continue throughout the next five years. To replace these ships, the Navy is funded to commission five Aegis destroyers over the same time period. The commissioning of the five Aegis destroyers will not lessen the Navy's reliance on the Aegis platform. The ship's that are being decommissioned are

[46] GAO, Surface Combatants, 42.
[47] Cohen, William S., 47.

less capable platforms that perform various escort mission or multi-national missions. The requirement to perform these missions will potentially be transferred to the Aegis platforms that currently conduct the power projection, carrier escort or forward presence missions. Another vital mission that Aegis equipped platforms provide is area air defense to Amphibious Task Force (ATF) or Amphibious Ready Groups (ARG) during amphibious operations. Additionally, the non-Aegis destroyers and all Aegis ships are the Navy's primary platforms for delivering surface fire support during amphibious operations. The decommissioning of the non-Aegis destroyers means an increased role for the Aegis ships in performing fire support.

Other factors affecting current force structure are the increasing cost of maintaining the aging fleet and the numerous upgrades required to the ship's combat system suite in order to remain credible against an evolving threat. Department of Defense officials note the cost of operating and supporting the current fleet and other Navy and defense mission priorities also effect surface combatant force size. One way of reducing this cost and maintaining current force structure is to extend the service life of ships. The typical ship is built to last for 30 years. If this is extended to 35 years, current force structure can be maintained. The extent to which these longer service lives can be achieved will have an important bearing on whether the Navy is able to sustain desired force levels.[48] The extension of Aegis ship's service lives to 35 years is a sound decision that has been proven feasible through the extension of other class of ship's service life. The Navy has successfully extended the service life of its current amphibious landing and docking ships (LPD), conventional carriers (CV), and several auxiliary class ships.

[48] GAO, Surface Navy Combatants, 6.

The ability of the surface Navy to simultaneously perform these varied missions and tasks while the fleet is being downsized highlights the multi-dimensional capability of the surface fleet. The planned addition of the Navy Area Defense and Navy Theater Wide defense missions will however, further challenge the ability to fully utilize the flexibility of the Aegis platform. The surface Navy's ability to perform the future missions of Navy Area and Theater Wide defense will significantly upgrade the fleet's ability to defend forward deployed U.S. forces and our allies against short and intermediate range ballistic missiles.

National Missile Defense Mission Requirements

The Surface Navy's force structure is sufficient to fulfill its current mission as warranted by the National Security Strategy. The Navy's unique ability to maintain forward presence while conducting power projection illustrates a force capable of conducting multi-missions simultaneously. However, the requirements for ship positioning and weapons load-out to perform the mission of National Missile Defense (NMD) tend to conflict with the missions and weapon load-outs required for theater missions.[49] Theater missions are missions specific to a designated theater such as area air defense, power projection through the firings of Tomahawk missiles, carrier escort, and NTW. The ships that perform these theater missions are the Aegis platforms. Consequently, the same Aegis platforms currently performing the theater missions are expected to perform the mission of NMD.

The Aegis ship has proven its ability to detect and track ballistic missiles through a series of tests performed over the last couple years. These tests indicate that the radar system

[49] Department of Defense, Ballistic Missile Defense Organization, 2.

can detect and track low orbit ballistic missiles. The success of these tests has prompted planning for the development of an upgraded system that could be used to detect and track higher flying and faster ballistic missiles. Furthermore, the Aegis ship's successful firing of Tomahawk missiles using external queuing data has initiated the belief that an upgraded standard missile can be employed against ballistic missiles using external queuing data. Superficially, the objections to using existing ships to perform NMD are illustrated by organizational and technical shortcomings and mission identification problems that the NMD role would create.

NMD Technical Shortcomings

The proposed use of existing Aegis ships to perform NMD is a concept that requires several significant shipboard changes in order to for accomplishment. The Aegis combat systems suite would have to be significantly altered to include upgrades to the Aegis Weapons System software; the ship's vertical launching system would have to be altered to accommodate longer missiles, and the command, control, and communications (C3) suites upgraded to enhance global command interfaces.[50]

The current software used to integrate the Aegis systems is not configured to interact with the proposed NMD system. The NMD system is more sophisticated and will require more software, shipboard computers and a complete rework of the shipboard and exterior systems interoperability to accomplish NMD missile firings.

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[50] Ibid, 13.

The proposed NMD ship based interceptor would be an upgraded standard missile configured with an exo-atmospheric (altitudes greater than 70 km) kill vehicle (EKV). The addition of these NMD standard missiles will require alterations to the VLS launchers and reduce the number of Tomahawk and anti-air missiles that a surface ship can carry. Changes to the VLS launcher are required because the proposed NMD missiles will be longer and heavier than any ship-launched missile in the current inventory. The increased height and weight requirements are needed to accommodate a larger warhead and the increased fuel capacity required to intercept ballistic missiles in the boost phase. In order to assess the feasibility of upgrading the proposed NTW interceptors to make them NMD-capable, the Navy reportedly has been studying, six-pack cell modules for the VLS system…in this case, the cross section of each missile cell would be increased from 21 inches to 26 inches.[51] The VLS launcher deployed on all current ships is based on eight-pack cell modules. The conversion to a six-pack module will reduce the total number of missiles that can be employed on the converted ship. Additionally, once configured for NMD, these platforms will significantly reduce the number of missiles available to the geographic CINC for carrier defense and land strike missions. If a typical VLS ship missile configuration is changed in order to accommodate theater missile defense systems, the reduced capability must be replaced by other VLS Aegis platforms, if aircraft carriers and other high-value surface ships are not to be put at greater risk.[52] To prevent placing the high-value surface ship at risks the Navy must deploy more VLS capable ships configured to provide high-value unit protection.

[51] Jones, Rodney M. 14,15.
[52] Jones, Rodney M, 21.

Furthermore, the resulting NMD platform will have a degraded air, surface, and subsurface self-defense capability. This limited self-defense capability arises from the requirement to redesign the VLS launcher to accommodate the longer and heavier exo-atmospheric interceptor. The redesign will decrease the total number of cells, widen the remaining cells, and potentially raise the height of the launcher. These redesign requirements for NMD ships will preclude the load-out of air-to-air, air-to-surface missiles, or Tomahawk missiles in the VLS launcher unless the missile canisters are altered. [53] Additionally, these interceptor missiles will be heavier and require more fuel than any current missiles in the Navy's inventory. The additional missile weight and structural support rework required to house the NMD system would significantly alter the current Aegis ship design and require an extensive overhaul of the VLS launcher support and hull structures.

The launcher and hull structure redesign if completed in 2010 and performed on the earliest VLS cruisers, would result in significant changes being conducted on platforms that are over 20 years old. The first VLS cruiser was commissioned in 1986. The major VLS alterations would have to be performed on each ship assigned the mission of NMD. Once the system alterations are completed, the ship's ability to perform "traditional" Navy missions would be significantly reduced.

[53] VLS launchers cells are loaded with individual missile canisters. The canisters loaded into current VLS ships are generally the same length. The canisters required for NMD missiles will be significantly longer and require current canisters to be altered to fit into the launcher.

NMD Organizational Shortcomings

The upgraded NMD platforms will force the surface Navy to relinquish operational control to the National Command Authority via Strategic Command (STRATCOM). The proposed strategic mission that NMD platforms will assume mandates the ships become national strategic assets. The NMD ships' primary mission will be to provide homeland defense. The missions as assigned by the geographical command-in-chief (CINC) responsible for the area the NMD Aegis will operate will become secondary or tertiary roles for the NMD ships. One can anticipate that STRATCOM will mandate dedicated platforms strategically positioned ready to respond to an intercontinental ballistic missile threat everyday of the week, 24 hours a day. Depending on the threat, the positioning of these ships could require as few as 3 different locations or as many as 13 locations to provide protection against all threats simultaneously.[54] Assigning the Aegis ship the mission of NMD is similar to the mission assigned to the ballistic missile submarine. The ballistic missile submarine is a national strategic asset whose primary mission is to remain undetected but continue to communicate with STRATCOM to perform missions as required. The Aegis ship assigned NMD will also be required to remain in international waters, outside the range of the enemy's weapons and maintain uninterrupted connectivity with the STRATCOM. The difference is that the submarine is below the water's surface while the Aegis is above the water's surface. The Aegis in the performance of NMD will be vulnerable to attack from other surface ships, submarines and aircraft. To reduce the threat of attack, additional Aegis ships may be required to be with the NMD platform to provide surface, subsurface and air defense.

NMD Force Structure Changes

The acquisition of ten new construction Aegis cruisers is recommended to ensure the surface Navy ability to conduct sea-based NMD. The ballistic missile defense organization in its report to Congress, recommended 3-6 additional Aegis platforms to support a limited stand-alone NMD system.[55] The ballistic missile defense organization's relatively small-recommended number of additional ships does not address the requirement for the boost-phase missile intercept. The organization's report was based on mid-course intercept and thus de-emphasized the special requirements required for boost phase intercept. These special requirements are centered on decreased reactions times and an increased missile speed requirement. The recommendation for ten additional ships will provide dedicated assets for NMD, prevent the use of existing Aegis ships required to conduct theater missions, and enable the surface Navy designers to construct ships specifically built for NMD.

Another significant consideration for the building of ten additionally Aegis platforms are to ensure the safety and security of the NMD Aegis. The NMD Aegis would be a national strategic level asset that should not be required to become encumbered with having to fire a ballistic missile interceptor while simultaneously trying to destroy an inbound low altitude missile threat or defending itself against a submarine threat. The ten NMD Aegis ships should be solely responsible for NMD defense.

Finally, ten new construction ships are needed to prevent an unwanted gap in the surface fleet's ability to perform its "traditional" missions. The proposed schedule of

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[54] Ibid, 15.
[55] Rodney Jones, 22.

deployment for the sea-base NMD system is dependent on the successful deployment of the NTW system and the development of the upgraded standard missile interceptor; however, no specific timelines have been given for the deployment of a NTW system. If one assumes the NMD system is deployed and operational by fiscal year (FY) 2010, the Aegis ships commissioned prior to 1990 will be over 20 years old. The total number of VLS ships commissioned prior to 1990 is nine. The extended expected service life of each of these ships is 35 years. Therefore, if the first nine VLS capable ships are converted to NMD platforms beginning in 2010 and completed by 2020 the first NMD converted ship will be scheduled for decommissioning in 2021 with no replacement currently being planned. If the proposed timeline is delayed or postponed, the possibility exists that the Aegis cruisers being considered for conversion will begin to reach the end of their service life and require decommissioning prior to the full deployment of a sea-based NMD system. This estimate is based on the fact that the surface Navy has only one type of combatant ship building program funded, the Arleigh Burke destroyer, the last ship is scheduled to be commissioned in 2010. The other ship being developed to join the fleet is the DD-21, Zumwalt Destroyer. The Zumwalt Destroyer is being built to replace the aging Spruance destroyers and Olivard Hazard Perry frigates. However, the DD-21 is primarily being designed to perform anti-submarine warfare, land attack, and surface fire support missions. In its current design, the DD-21 will not offer the area defense capability required for a proposed NMD surface platform.

Budgetary Concerns

The research, development, and acquisition of a stand-alone sea-based NMD would be a costly but worthwhile investment. The Ballistic Missile Defense Organization in its 1999 Summary of Report to Congress on Utility of Sea-Based Assets to National Missile Defense outlined the anticipated cost for deploying a stand-alone sea-based system. The cost estimates submitted to Congress for a stand-alone system that could protect all 50 states was 16-19 billion dollars in FY 1997 dollars and included the estimated cost of procuring 3-6 Aegis type ships.[56] The report estimated the cost of a stand-alone land based system would range between $13-$14 billion in FY1997 dollars. The sea-based system cost estimates were based on a system capable of defending the United States equivalent to the homeland defense capability of 100 ground-based interceptors located in a single site.[57] The writer has proposed the building of 10 new ships for a stand-alone sea based system and therefore would expect the cost required to deploy the system to be nearly double the estimate provided in the BMDO report. A more accurate cost of fielding a stand-alone sea-based system is probably closer to $32 to $38 billion for boost phase intercept. Several articles supporting the use of current Aegis ships to perform the role of NMD advertise that the cost is significantly less than the writer's proposed $32-38 billion; however, these supporters severely under estimate the immeasurable cost associated with naval missions tradeoffs.

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[56] BMDO, 5.
[57] Jones, Rodney, 17.

The $32-38 billion cost proposed to build ten new ships is a minor investment for the benefits that will be gained and will potentially eliminate the organizational and technical difficulties the surface Navy will encounter by assuming the mission of NMD. These additional ships will prevent the removal of essential Aegis assets from the current deploying surface fleet in order to undergo structural, electronic, and communications upgrades required to perform the mission of NMD. These upgrades will require an extensive overhaul of the combat systems suite, communication equipment, and VLS launcher that could take an undetermined amount of time to accomplish; yet these ships undergoing the upgrades will be unavailable for deployment or local operations. The limited number of available surface ships coupled with the increasing requirements for Aegis platforms to perform more of the Navy's "traditional" missions makes the uninterrupted deployment of the Aegis platforms invaluable to the Navy's future.

The building of new ships also eliminates the requirement for the successful development, testing and installation of upgrades on technical systems developed in the 1980's and 1990's. The ten new ships will allow the designers to develop and employ electronic systems using current technology specifically designed to accomplish the NMD mission.

Chapter 5

Conclusions

If assigned the role of National Missile Defense, the force structure for the surface Navy force must change. The use of existing Aegis ships to perform the NMD mission is not feasible. The Aegis ship's successful standard missile and Tomahawk strike missile firings

coupled with its multi-dimensional make-up has given many the false impression that adding sea-based NMD, as a primary mission of the surface Navy, would be easy and flawless. Although the Aegis ship is a proven platform capable of performing several different missions simultaneously, the addition of the NMD mission without additional force structure will reduce the fleet's overall effectiveness. Overall effectiveness will be reduced because deploying ships will have fewer theater assets, be required to perform a singular mission, and possess a reduced capability for self and battle force defense. Building 10 additional ships will eliminate potential gaps in carrier air defense, Navy Area Defense, and Navy Theater Wide Area Defense and ensure that the Aegis ships performing theater missions will not be re-assigned to perform NMD. The personnel and equipment on these platforms are state-of-the art and offer a geographic CINC innumerable employment options, deploying NMD on current ships will significantly decrease the employment options available to a commander.

The land based NMD system is being designed as a singular mission system with dedicated interceptors and communication equipment. The writer proposes that the sea-based NMD system be developed and deployed with the same considerations, adding 10 additional NMD surface ships would achieve this mission. Additionally, building these additional ships would prevent compromising the effectiveness and functionality of the current and future Aegis surface fleet and afford system designers the ability to develop and deploy a ship specially designed to perform the NMD mission. The expenditure requirements to build and deploy 10 new ships are well conceived. The Aegis ship has proven to be a capable platform that offers unencumbered flexibility and mobility. These platforms operate forward deployed in international waters with all required weaponry loaded and can remain on station indefinitely. The advantages of the Aegis sea-based system is that it allows the

ballistic missile to be destroyed while it is still over the launch country and prior to reaching the outer atmosphere. The Aegis would also offers the NCA a crucial rapid response that could destroy the intercontinental ballistic missile aimed for the U.S. during its most vulnerable timeframe, the boost or ascent phase. The Aegis platform is the backbone and the future of the surface Navy. The reality that the Aegis platform is both the foundation and future of the surface community is a contradiction. Therefore, the removal of existing Aegis platforms from the deploying fleet in order to complete NMD upgrades severely degrades the surface Navy's ability to perform its mission. Furthermore, the next planned generation of surface ships will not replace the current Aegis technology, but instead will complement the Aegis ships and offer some relief from current missions.

The ten additional ships are needed because the surface fleet is getting older and outdated. The present day Oliver Hazard Perry frigates and Spruance destroyers are less capable platforms that offer a diminished capability against the evolving conventional missile threats of world. The diminished capability is discernible because of their older and less capable combat suites and command and control systems. The frigates generally perform escort shipping and multi-national missions and the Spruance destroyer generally performs escort shipping and power projection through the firing of Tomahawk missile. These platforms are not equipped to provide the theater assets that an Aegis ship offers and unless the service life of these non-Aegis platforms are extended, the Aegis ship will have to assume the missions primarily assigned to these less capable platforms. By assuming primary responsibility for this mission, the total number of Aegis ships available to perform theater or NMD missions will be reduced.

None of the proposed missile designs and combat system upgrades is completed. The projected weapons and communication equipment to be used in the system are evolutionary systems and is based on technology currently being deployed on the Aegis surface platform. The infrastructure and knowledge required for the building and designing of an NMD system could change significantly from the current systems in place and warrant significant production and design changes. Also, the removal of the option to design and deploy a newer more capable ship could hamper the development of a sea-based NMD by constraining the system developers into developing a futuristic system that has to meet today's ships limitations. The commitment to build 10 ships specifically designed for sea-based NMD will eliminate the possibility of system constraints and limitations.

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